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U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF THE

Chief of the Division of Biological Survey

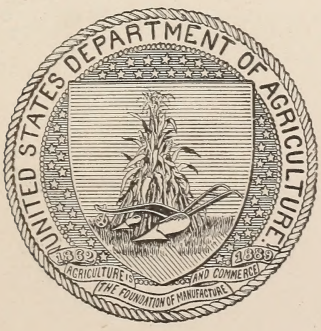
FOR

1904.

BY

C. HART MERRIAM.

[From Annual Reports, Department of Agriculture.]



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REPORT OF THE CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY.

U. S. Department of Agriculture,
Division of Biological Survey,
Washington, D. C., September 1, 1904.

Sir: I have the honor to submit herewith a report of the work of the Biological Survey for the fiscal year ending June 30, 1904, with outline of work for 1905, and recommendations for 1906.

Respectfully,

C. Hart Merriam, *Chief.*

Hon. James Wilson, *Secretary.*

WORK OF THE YEAR.

As heretofore, the work of the Biological Survey has been conducted along the three lines laid down by Congress: (1) Investigations relating to the geographic distribution of animals and plants, including biological surveys and the determination of the life and crop belts, in charge of the Chief; (2) investigations of the economic relations of birds to agriculture, in charge of Prof. F. E. L. Beal; (3) supervision of matters relating to game preservation and protection and the importation of foreign birds and animals, in charge of Dr. T. S. Palmer.

SECTION OF GEOGRAPHIC DISTRIBUTION.

The Biological Survey is engaged in mapping the natural life zones and crop belts of the country, for the primary purpose of showing the farmer what crops are likely to prove a commercial success in his locality. The work is done by studying the geographic distribution of native animals and plants in all parts of the country and platting the results on maps showing the distribution of each species. The task of preparing these maps is progressing as rapidly as practicable in view of the limited number of assistants qualified for this branch of the service. In order to obtain the necessary data the status of the various species must be determined by office study, and their ranges laboriously worked out in the field. From the nature of the case many species are worked together—those inhabiting a particular area or region—so that the results are cumulative and their maps will be finished at the same time. The progress already made is gratifying and a large number of maps are now approaching completion. The

individual species maps serve as the basis of a composite map showing the natural transcontinental belts and their more important subdivisions.

During the current year field work has been carried on over wide areas in California, Texas, New Mexico, Colorado, Alaska, and also in several Provinces of Canada and States of Mexico.

In California the field operations for the purpose of securing data for a detailed map of the life and crop zones of the State have been continued under the personal direction of the Chief, along the western slope and foothills of the Sierra Nevada, in some of the interior valleys, and among the Coast Ranges south of San Francisco Bay.

The field parties in charge of Vernon Bailey, chief field naturalist, have practically completed work in western Texas, and are now in New Mexico. In Texas explorations were carried on mainly in the Panhandle region and the southwestern corner of the State in the vicinity of El Paso. In New Mexico field work was done in the northern, middle, and southern parts of the Territory. The work in Mexico, under the direction of E. W. Nelson, was continued, and a supplementary study of the distribution of animal and plant life was made on the southern end of the Mexican table-land, on the Isthmus of Tehuantepec, on the coastal lowlands near Tampico, and in the highlands of Chiapas. The biological exploration of the Mackenzie Basin, including Great Slave Lake and part of the Barren Grounds in the neighborhood of Great Bear Lake, was continued from the previous year. E. A. Preble, who has charge of this work, wintered at Fort Simpson on the Mackenzie for the double purpose of studying the conditions during an arctic winter and of being on the ground to resume field work in the early spring long before the opening of communication with the outside world. These investigations, in connection with recent work in Labrador, and the explorations already carried on by the Biological Survey in the Hudson Bay, Athabasca, and Great Slave Lake regions and Alaska, will form a most valuable chain of observations, making it possible for the first time to understand and intelligently discuss the distribution of the numerous boreal types of animals and plants that inhabit Alaska and enter some of the Northern States. Explorations in Alaska have been continued under the direction of Wilfred H. Osgood, among the northern spurs of the Rocky Mountains, about the upper and middle Yukon, and on some of the islands of southeastern Alaska. A report on the work done by Mr. Osgood about the base of Alaska Peninsula in the summer of 1902 is ready for the press, and will appear shortly.

SECTION OF ECONOMIC ORNITHOLOGY.

In the section of economic ornithology, as in previous years, both laboratory work and field observations were carried on—the former consisting of the examination of stomachs and crops of birds and the tabulation and comparison of their contents; the latter comprising a study of birds in their native haunts. It is believed that it is impossible to place too high a value on an accurate knowledge of the food of our native birds. The best and simplest means of arriving at this knowledge is by the examination of stomachs. Such examinations, supplemented by field studies, have always been a feature of the work of the Biological Survey. Orchards, gardens, and grain fields are

visited for the purpose of determining whether the birds damage crops, attack injurious insects, or devote their energies mainly to the wild fruits and weed seeds of the neighborhood; and collections are made of food materials, including wild fruits, berries, seeds, and insects, to assist in the work of determination in the laboratory.

During the current year examinations have been made of 2,189 stomachs, distributed among various groups as follows:

Quail and grouse	728	Flycatchers	35
Wrens, tits, kinglets	367	Swallows	99
Warblers	307	Miscellaneous	15
Finches	600		
Blackbirds	38	Total	2,189

In studying the food habits of California birds with reference both to the damage they inflict upon fruit and the good they do in destroying noxious weeds and insects, Professor Beal spent seven months (February to October) in the State interviewing many of the fruit growers and visiting the most important fruit-growing sections. Most of his work was in the orchards, where the actual mischief done by the birds was noted and specimens were collected. Besides those secured by him, a great many stomachs have been received from other collectors in the State, and it is believed that in the case of many species enough material is at hand to show the good and harm done by each, so that the fruit grower may know which kinds to encourage and which to restrain.

In 1903 the University of California, in conjunction with the two great apple-raising counties of Santa Cruz and Monterey, undertook an investigation of the ravages of the codling moth with a view of devising, if possible, some remedy for the immense damage done the apple crop by that insect. The annual product of apples in the Pajaro Valley, where the investigation was carried on, is valued at more than a million dollars, even when the codling moth has unrestricted sway. The inquiry was placed in the hands of a commission under the supervision of Prof. C. W. Woodworth, of the State University, and was carried on by competent assistants. One branch of the work was devoted to ascertaining what restrictive influences, if any, were exercised by birds upon the increase of the moth in any of its stages. In coopera tion with the United States Biological Survey, Mr. J. S. Hunter, who had charge of this part of the work, conducted the field studies and sent his bird stomachs to our laboratory for examination. Professor Beal also visited the Pajaro orchards in order to familiarize himself with the local conditions, and since his return has been engaged in examining the contents of these stomachs, together with those obtained by himself and others in various parts of the State. One of the results is the gratifying discovery that the codling moth, in spite of its self-protecting habits, is preyed upon by at least two species of birds. As the adult moths fly only at night, and the larvæ live inside of the apple, it was hardly expected that birds would be able to capture them. But when the larvæ leave the apple they seek crevices in the bark of the trees, or descend to the ground to pupate where they conceal themselves among clods of earth or rubbish. These pupæ, it was found, had been searched out and eaten to a considerable extent by the black-headed grosbeak (*Zamelodia melanocephala*) and Bullock oriole (*Icterus bullocki*), two of the handsomest and commonest song birds of California.

As complaint has been made that birds destroy honeybees, a large number of bee keepers were interviewed, especially in southern California, and much information on this point was obtained. It was found, however, that such ravages are special rather than general, and the majority of bee keepers had no complaint to make. Stands of bees placed in lonely canyons where birds are abundant are sometimes visited by them to such an extent as to cause the inference that the bees are being preyed upon. Further investigation, however, has cast some doubt on the supposed injury done by birds; for the examination of stomachs of birds shot near beehives almost always shows that if bees are eaten at all the ones selected are the males or drones. Recently about a hundred stomachs of cliff swallows (*Petrochelidon lunifrons*) were examined, of which a large proportion contained honeybees—some as many as eight individuals—but in no instance was a worker bee found, the birds having eaten only the drones. Since swallows take their food on the wing, this seems to demonstrate that they easily distinguish the drones from the workers in mid-air and take the former by preference.

Some interesting preliminary observations were made as to the damage done by seed-eating birds to the great seed farms of California, but this subject requires further investigation.

In continuation of the studies of the food habits of game birds, Dr. Sylvester D. Judd has given special attention to the quail, particularly during the winter, to ascertain where the birds live and what they eat during the inclement season. The careful and detailed study of this bird has demonstrated beyond question that from an economic point of view the quail is one of the most valuable of North American birds. Examination of the contents of large numbers of crops and stomachs has revealed the important fact that throughout its broad range it feeds largely on some of the worst insect pests known to agriculture. Among the important insects eaten are the cotton boll weevil, potato bug, chinch bug, wireworm, cutworms of various kinds, and the cotton bollworm. Besides destroying multitudes of these pernicious insects the quail devours very large quantities of seeds of noxious weeds; and since much of its time is spent in cultivated fields the value of its services to the farmer can hardly be exaggerated.

BIRD MIGRATION.

During the year the usual spring and fall migration schedules were sent to and received from the regular observers and filed for future use. Sixteen thousand notes relating to the migration of warblers north of the Ohio and Potomac rivers, to complete a bulletin on North American warblers, were selected and arranged for publication.

With a view to determining more accurately the location of the principal routes taken by migratory birds, a circular was issued requesting data on the arrival and departure of five common species—the nighthawk, catbird, kingbird, red-eyed vireo, and redstart. Copies of this circular were distributed to a large number of observers, and it is hoped that important information may be received, especially from localities hitherto unrepresented. Work was commenced on a study of the relations of migration and the weather by comparing the time of spring arrivals with the temperature at the place of arrival and in the region to the southward.

SECTION OF GAME PROTECTION.

In the section of game protection, in charge of Dr. T. S. Palmer, considerable attention has been directed to the work of organization, and the office is now much better equipped than formerly to meet the various demands made upon it. Current work has been kept up to date and several special investigations have been pushed to partial or entire completion. As heretofore, work has been conducted on four well-marked lines: (1) Supervision of the importation of foreign birds and mammals; (2) cooperation in restricting interstate shipments of game contrary to law; (3) protection of game in Alaska, and (4) collection and publication of matter relating to game protection.

IMPORTATION OF FOREIGN MAMMALS AND BIRDS.

During the year 318 permits were issued for the entry of 1,470 mammals, 205,400 canaries, and 41,630 miscellaneous birds,[a] and 9 for the entry of 2,858 eggs of partridges and pheasants,[b] as compared with 383 permits issued during 1903 for the entry of 629 mammals, 201,527 canaries, and 53,106 miscellaneous birds, and 4 for the entry of 2,000 eggs of pheasants and partridges. Of the 327 consignments entered in 1904, inspection was made of 99 at the port of New York, as compared with 103 the previous year. The record of the past year shows an appreciable decrease both in the number of permits and in the number of miscellaneous birds imported thereunder.

The decrease in the number of birds is due to several factors, among which may be mentioned enforcement of the law against possession of Chinese quail in California, and requirement by the Treasury Department of what is known as "owner's oath." In January the board of fish commissioners of California took active steps to enforce the quail law, and importations of Chinese quail practically ceased, with the result that the total number received this year was only 5,120, as compared with 7,450 in 1903. Under the requirement of "owner's oath" the owner of imported goods actually purchased must declare them before a customs notary or a notary public designated by the Secretary of the Treasury. The difficulty of complying with this requirement necessitated the cancellation of a number of orders for pheasants from Canada. The main cause of the difference between the figures of this year and those of previous years, however, particularly in the case of cage birds, is the fact that those of 1904 show the number of actual entries, as nearly as possible, instead of being based on the numbers shown by the applications for permits. Since some birds for which permits are issued are not shipped, or die en route, the figures given this year are smaller than those of last year, though much more accurate. The apparently large increase in mammals is due to the entry of 1,043 guinea pigs. The number of other mammals was 427, as compared with 457 the previous year.

The importations of the year include several entries worthy of note. Among the mammals were 228 squirrels, 52 hedgehogs, 2 echidnas, and several rare marsupials from Australia. Among the game birds

[a] These figures practically exclude parrots, which require no permits, and of which 17,325 were entered during the year, though a few that arrived in miscellaneous shipments and were mentioned in the permits, are here included.

[b] Not including 1 box containing an unknown number of eggs.

were 65 capercailzie imported by the fish and game commission of Ontario for liberation in the Algonquin Park in Ontario. About 40 Mexican quail (*Lophortyx elegans*), obtained near Ures, Sonora, in the latter part of February, 1904, were imported by the board of fish commissioners of California; 10 pairs were liberated in the San Joaquin Valley, 5 at Bakersfield, and 5 near Del Rey, and the remainder were kept in captivity at Sacramento. Among the entries of game birds for exhibition and aviaries were several rare pheasants and a talagala cock (*Megacephalon maleo*).

Although the cage-bird traffic of the United States is small in comparison with that of some foreign countries, notably Germany, nevertheless 35,000 miscellaneous birds other than game birds arrived at various ports during the past year. About one-third of the cage birds imported (10,400) were European species. Of these, 5,000 were goldfinches and 1,200 linnets, both imported in large numbers for breeding with canaries. The remainder comprised 1,350 bullfinches, 900 siskins, 900 skylarks, 600 chaffinches, and 450 miscellaneous birds. A consignment of 366 European birds containing goldfinches, bullfinches, larks, and robins, intended for liberation in British Columbia, was imported at New York in November, 1903. The Orient furnished a variety of species, chiefly Java sparrows, of which 4,750 were imported, and strawberry finches (*Sporæginthus amandava*), of which 1,000 came in. Twenty per cent of the Java sparrows were the white form produced under domestication. Of Australian birds, the most popular seem to be the grass parrakeet, of which 3,400 were brought in, and the cockatoos and the zebra finches, all hardy species in captivity. Aside from parrots comparatively few cage birds are imported from Mexico and South America, but among those received may be mentioned 500 gray cardinals from South America and 120 Mexican solitaires from Vera Cruz. No permits are required for the entry of parrots, the number of which imported, 17,325, shows a considerable trade in these birds. Of the total, 6,993 were entered at El Paso, 6,115 at New York, and 4,020 at San Francisco. A few were also received at Philadelphia, New Orleans, and Pensacola. A small consignment of Madagascar weavers (*Foudia madagascariensis*) which arrived in January, 1904, is of special interest. This is one of the species which should be carefully watched as it has proved very injurious in some regions where it has become acclimated. Since the birds in question are to be kept in captivity, however, no danger is apprehended from their entry. Two lots of miscellaneous birds from Calcutta which arrived at New York in April, 1904, contained certain species of minas, jays, thrushes, magpies, bulbuls, and hunting crows, rarely brought to the United States.

Efforts have been made to improve the service in several respects. An additional inspector at the port of New Orleans was appointed on April 12, 1904, making a total of fourteen. Of these, three are stationed at New York, two each at Boston, Philadelphia, Baltimore, New Orleans, and San Francisco, and one at Honolulu.

So far as known no injurious species have been entered during the year. Two European starlings which, through ignorance of the law, were ordered with a small consignment of other cage birds, were left in England and other birds substituted for them. In May the Bishop Museum in Honolulu received a small consignment of birds from New Zealand, in which were 6 specimens of the kea (*Nestor notabilis*), well

known on account of its alleged habit of attacking sheep. The importation of these birds met with considerable opposition in Honolulu, and soon after their arrival they were killed by order of the trustees of the museum.

INTERSTATE COMMERCE IN GAME.

During the year 10 cases involving the shipment of 700 birds and 36 rabbits were reported to the Department as against 35 cases involving the shipment of 3,729 birds[a] during the preceding year. During the year 6 convictions and several indictments were secured, making a total of 42 convictions in cases passing through the Department since the passage of the Lacey Act in 1900. Of these, 26 convictions were secured in Federal courts and 16 in State courts. One notable conviction, involving the shipment of game from St. Paul, Minn., to Portland, Oreg., was secured during the year. In this case, which was based on the longest shipment thus far taken up under the Lacey Act, it was necessary to bring witnesses from the Pacific coast to St. Paul, Minn. The successful outcome was due not only to the efforts of the United States attorney at St. Paul, but also to cordial cooperation on the part of the State wardens of Minnesota and Oregon. In connection with this phase of the work mention should also be made of the cooperation of the State game commissioner of Illinois and the State game warden of Iowa, both of whom, as in past years, have rendered invaluable service.

Efforts have been made to encourage officials cognizant of violations of the Federal law to present their evidence directly to the nearest United States attorney or United States commissioner instead of referring it through this Department and the Department of Justice, but for some reason State wardens often hesitate to take a case into the Federal courts. Up to the present year little progress was made in this direction, but during the past few months two or three cases have been presented direct to the courts and indictments promptly secured.

As stated in the last annual report, owing to limited resources efforts have been concentrated in two or three areas. Whenever possible, prevention of the illegal shipment of game has been given preference to prosecution of the shippers after shipment has taken place. The enactment of a law in Texas in 1903 prohibiting the sale and export of waterfowl made it possible for the first time to restrict the enormous destruction of ducks for northern markets, which has occurred in that State in recent years. Through local authorities and express companies general attention was called to the provisions of the State and Federal laws, and a close watch maintained on the usual routes of shippers. These efforts were so far successful that, notwithstanding special endeavors to detect unlawful shipments, no exportation of waterfowl from Texas was noted, and it is safe to assume that comparatively few consignments of ducks reached northern markets from the gulf coast of Texas during the year. Similar efforts have been made to restrict illegal shipments of quail and prairie chickens from certain States west of the Mississippi River, and also of quail from North Carolina, but in the last case with only partial success.

[a] Not counting 10 barrels of prairie chickens.

In order to ascertain the results accomplished by recent legislation prohibiting shipment and sale of game, a special investigation was undertaken during the fall in cooperation with State wardens and correspondents in a number of States. Correspondents were asked to ascertain the kinds of game, the sources of supply, and the prices at which game was offered for sale in the markets of a dozen or more important cities during Thanksgiving week. This week was selected since it occurs during the open season in practically all the States and at a time when game is in general demand, so that statistics are more comparable than they would be if collected at different times and under varying conditions.

Owing to unforeseen delays the returns which should have been available before Christmas were not received until too late for use during the open season of 1903, but they will be useful for comparison with similar statistics collected in the future. The investigation showed conclusively that considerable progress was being made in enforcing the shipping laws. For the first time in recent years prairie chickens were almost entirely absent from the markets of Washington, D. C., and very few were on sale in any of the eastern cities. Quail also were unusually scarce in the eastern markets at the opening of the season; but later, when the routes of shipment still open were discovered by the trade, birds were obtained in greater numbers. A marked decrease in the shipment of deer was also noticeable, and venison in the carcass was absent from the markets of several cities where formerly it was abundant. The growing scarcity of game and the stringency of shipping laws have resulted in a remarkable increase in the price of certain game, particularly of prairie chickens. At the opening of the season these birds brought from $12 to $15 per dozen wholesale in Chicago, where a few years ago the regular rate was only one-third or one-fourth these prices.

PROTECTION OF GAME IN ALASKA.

The Alaska game law has accomplished the main objects for which it was enacted, namely, stopping the shipment of hides of deer and curtailing the export of heads of moose and other big game for trophies or commercial purposes. The general feeling in the Territory seems to be in favor of protecting the game, and in a few places an unexpected interest has been taken in the enforcement of the law.

From the standpoint of game protection the law has perhaps been as satisfactory as could have been expected in such a vast region, and without the employment of wardens, yet it has aroused considerable opposition. This appears to be due in part to the unnecessary stringency of certain features of the present statute, and in part to the killing of big game on the Kenai Peninsula by visiting sportsmen, who are attracted by the accessibility and abundance of the white sheep and giant moose. The opposition became so strong that on February 8 a bill was introduced in the Senate to repeal the present law and to substitute merely a provision for the issue of licenses permitting the shipment of a limited number of big game trophies, with fees of $25 for residents and $250 for nonresidents. No definite action was taken on this measure prior to the adjournment of Congress, and as the matter is still pending the Department has deemed it advisable to suspend the issue of permits for the present, except in special cases. During the fiscal year 60 permits were issued for the export

of trophies and scientific specimens, nearly all of which were issued prior to the introduction of the Senate bill. Of these, 5 will probably not be used until next autumn. The remaining 55 were for use within the fiscal year 1904, and as 34 issued during the spring of 1903 were not to be used until after July 1, 1903, 89 export permits in all were in effect during the year. Twelve of these were issued to foreigners, and 77 to citizens of the United States. Many permits were not used, and the actual number of shipments was therefore much smaller than these figures would indicate. Early in June a new set of regulations was issued for the current year, extending such open seasons as experience showed could be lengthened without injury to the game, permitting unrestricted shipment of bear skins, and making other changes that seemed to be necessary to adapt the law to the needs of the Territory.

TRANSFER OF ELK.

An item in the appropriation bill for 1904 providing for the transfer of elk has finally made possible the acceptance of a herd of these animals in Kern County, Cal., offered to the Department several years ago by Miller and Lux. This herd, numbering about 100 animals, has been protected for a number of years by the owners of the ranch. In order to find a locality affording suitable range and adequate protection, an examination was made of the forest reserves in southern California, and a location was selected in Tulare County, on the Middle Fork of Kaweah River, just within the confines of the Sequoia National Park. This range affords both summer and winter feed and abundance of water, and is so situated as to require comparatively little fencing. Through the cooperation of the Secretary of the Interior permission was obtained to utilize this part of the park for a preserve, and to erect the necessary fence. A special wire fence, about 2 miles in length, along the western boundary of the preserve, was completed shortly before the end of the year. Natural barriers inclose all the rest of the tract except a short section on the eastern boundary, which also required fencing. Preparations were made to transfer the elk from their present quarters to the park, a distance of about 80 miles, but the actual transfer has been delayed, owing to the fact that the animals have not been captured and delivered at the railroad.

PELICAN ISLAND RESERVATION.

The warden maintained on Pelican Island Reservation, Florida, by the Biological Survey, in cooperation with the American Ornithologists' Union, has prevented molestation of the pelicans and has reported several facts concerning the habits of the birds not before recorded. The nesting season of 1903 was unusually long, extending from December 1, 1902, to July, 1903, when the birds left the island. Early in November, 1903, they returned and by the 4th were present in considerable numbers. Instead of building on the main island as usual, they nested on two small islands or mud flats near by. The first eggs were laid about December 1 and by the 5th of the month there were fully 150 nests with eggs. The first eggs were hatched about December 24, young covered with down were first noticed on January 13, 1904, and by the middle of March they were able to fly. At the

end of the month there was a notable decrease in the number of pelicans on the reservation, and by May 1 all the birds had left. The season of 1904 was anomalous in several respects. Although the birds returned to the island unusually early, they nested in smaller numbers than in the previous year, and considerable havoc was caused on February 11 and 12 by a hard 'norther,' accompanied by unusually high water, which flooded all the nests built on the ground. Whether this storm was responsible for the early departure is uncertain, and its full effect can not be ascertained until the birds return in the fall of 1904.

INFORMATION CONCERNING GAME PROTECTION.

The constantly increasing demands for information concerning game relate not only to the distribution and habits of native birds and the importation of foreign species, but often raise questions regarding game laws, technical and otherwise. When game bills are under consideration frequent inquiries are made for general information concerning particular features of legislation. Thus, when a search law was pending in Massachusetts last spring, a request was received from that State for a list of all the States having laws authorizing game wardens to search for and seize illegal consignments of game with or without a warrant; and when New York was considering a bill prohibiting spring shooting, several requests were received for statements showing similar legislation in other parts of the Union and Canada.

The Department is sometimes asked to send a representative to meetings of various kinds. When possible, these requests are complied with, in the belief that personal explanation is often the most effective method of disseminating information.

At the request of the National Association of Game Wardens, the preparation of an index of the more important decisions bearing on game laws has been undertaken. More than one hundred such decisions have been collected and are being indexed by title, State, and subject. This index will contain a brief statement of the facts in each case, and the syllabus, so as to show at a glance what points in game laws have been passed on by the higher courts in each State.

SPECIAL INVESTIGATIONS.

In addition to the investigations already referred to, special studies were made of several subjects connected with game protection, among the most important being that of game commissions and the enforcement of game laws. This work, which was begun two years ago, is now almost completed. The bulletin in which the results will appear will consist of a historical introduction, a statement of the protective work of each State, and abstracts of the laws relating to State game officials, its object being to show how game laws are enforced, a question concerning which many inquiries are received. Tables have been prepared showing the special officers charged with enforcement of game laws, their terms of service, duties, and powers, and the sources and distribution of funds for game protection. In connection with this work a personal examination has been made of the methods adopted by the commissions and wardens of New York, North Carolina, Maryland, West Virginia, Ohio, Illinois, Minnesota, Washington, Oregon, and California.

An inquiry from the fish and game commission of Ohio relating to the form of statement of seasons for game led to an investigation of the forms and interpretations of such statements, and to the preparation of a circular calling attention to the uncertainty and lack of uniformity in the forms in use, the trend of judicial decisions bearing on the subject, and the most available remedy for the evil.

A special report has been prepared outlining the history and development of the hunting license system in the United States—a subject attracting considerable attention, owing to the fact that in certain States licenses have become the chief source of income for game protection.

ROUTINE WORK.

During the year 1903–4 the routine work steadily increased. This consists of correspondence, accounts of expenditures, preparation of reports and bulletins for publication, identifying and labeling specimens, care of collections, cataloguing bird stomachs received, tabulating field reports, sorting and filing published matter valuable for reference, mapping distribution of birds and mammals, attention to the needs of field naturalists, developing photographic negatives and making prints therefrom, compiling game laws, issuing permits for the entry of foreign mammals and birds and for the export of trophies and specimens from Alaska, and cooperation in enforcing the various provisions of the act of Congress of May 25, 1900. The letters received during the year numbered about 5,000. Many of these were accompanied by schedules or reports; others contained other material also of permanent value. During the same period about 4,000 letters were written and 900 blank migration and other schedules distributed to observers. The collection of photographic negatives made by the members of the Biological Survey while in the field now numbers over 7,200, and is of constantly increasing value for purposes of study and illustration.

PUBLICATIONS.

The publications issued during the year include one number of North American Fauna, two articles in the Yearbook for 1903, four circulars, the report of the Chief for 1903, three Farmers' Bulletins, two large posters showing the close seasons for game, and 20 reprints of former publications. North American Fauna No. 23, by T. S. Palmer, comprises "A list of the genera and families of mammals." The Yearbook articles are entitled, "The economic value of the bobwhite," by Sylvester D. Judd, and "Some new facts about the migration of birds," by Wells W. Cooke. The circulars are as follows: No. 39, "Regulations for the protection of game in Alaska;" No. 40, "Directory of State game officials and organizations concerned with the protection of birds and game, 1903;" No. 41, "Migration of birds," and No. 42, "Regulations for the protection of game in Alaska for 1904." Farmers' Bulletin No. 54, "Some common birds in their relation to agriculture," by F. E. L. Beal, was rewritten and much material added on the food of western birds. The other Farmers' Bulletins published were: No. 180, "Game Laws for 1903," and No. 197, "Importation of game birds and eggs for propagation." The two posters showing the close seasons for game were prepared especially for display in railroad and express offices and other suitable places of business.

The reprints include North American Fauna No. 22, "A biological investigation of the Hudson Bay region," by E. A. Preble; Bulletin No. 17, "Birds of a Maryland farm," by Sylvester D. Judd; the annual report of the Chief for 1903; five circulars (Nos. 17, 29, 39, 40, and 42), six Yearbook articles, and two Farmers' Bulletins (Nos. 54 and 180). In the case of Farmers' Bulletin No. 54, "Some common birds in relation to agriculture," 360,000 copies have been issued since the date of the original publication. Of Farmers' Bulletin No. 180, "Game laws for 1903," a reprint of 15,000 copies was required to meet the demand, making a total of 45,000 issued.

The titles of the Yearbook articles reprinted are as follows: "Four common birds," 1895 (two issues); "Meadow lark and Baltimore oriole," 1895 (two issues); "Blue jay and its food," 1896 (two issues); "Birds as weed destroyers," 1898; "Food of nestling birds," 1900; "Audubon societies in relation to the farmer," 1902.

OUTLINE OF WORK FOR THE YEAR 1905.

GEOGRAPHIC DISTRIBUTION.

Field work in California will be continued during the year 1904–5, though owing to shortage of funds it will not be practicable to do as much as was planned. Work is outlined for the Sacramento Valley and the foothill slopes of the Sierra, and it is hoped that the region drained by Feather River and its tributaries may receive attention, and possibly also the southern Sierra between Kern Valley and Tehachapi.

In Texas the bulk of the field work has been completed, but some areas still remain to be visited before the final report is published.

In New Mexico field work will be conducted by two parties in the northern counties and will be extended into southern Colorado.

Explorations in Alaska are in progress, and, in cooperation with Charles Sheldon, of New York, the northern spurs of the Rocky Mountains about the upper and middle Yukon and adjacent Canadian territory will be visited at trifling expense to the Biological Survey.

It is expected that the biological reconnoissance of the Mackenzie Basin will be completed and that a general report will be prepared, including the regions about Great Slave Lake and Athabasca River.

ECONOMIC ORNITHOLOGY AND MAMMALOGY.

The investigation of the food of California birds will be continued, as will be also work on special bulletins relating to the food of groups of birds of economic importance. The data obtained from the examination of California stomachs add materially to the value of these bulletins, since exact information concerning the food of western birds has never before been obtained.

In Texas field work will be conducted in the cotton belt in cooperation with the Bureau of Entomology to determine what influence birds exert in controlling the abundance of the cotton boll weevil. It is expected that information will be secured that will prove of value in connection with the efforts of the Department to discover means of limiting the damage done by this insect.

Studies of the food habits of game birds are in great demand, and are being pushed as rapidly as practicable. The first results, so far as

they relate to the quail and grouse, are now ready for publication, and others will follow.

The food supplied nestling birds by their parents is a subject worthy of careful study and will receive as much attention as possible. Observations already made indicate that the quantity of food consumed by nestlings is enormous, and since in many species such food consists largely or wholly of insects, it has a definite economic importance. Some birds occasionally do harm, but experience shows that instances of damage are usually caused by conditions for which a remedy can be found. On the other hand, birds that never do harm and feed constantly on insects can be encouraged to nest and remain about the farm. Boxes may be placed for the useful martins, wrens, blue birds, and swallows. Small investments of this kind not only make country life more attractive, but pay the farmer liberal dividends in the way of increased crops. Public sentiment in relation to birds is slowly changing for the better, and there is no question that by the judicious protection and encouragement of the most useful species much good will result.

In past years the Biological Survey has published special papers on the economic status of certain noxious mammals and the best means of combating their depredations. The jack-rabbits, prairie dogs, pocket gophers, and Mississippi Valley ground squirrels have been thus discussed. This work will be continued. Among the animals to be taken up in the near future are the field mice and the coyotes and large wolves, groups which are highly destructive over large areas of our country. During the winter of 1903–4 hundreds of thousands of fruit trees were ruined by the gnawings of the thickset short-tailed meadow and woods mice of the genus *Microtus*, and at the present time the success of the sheep industry is in some sections seriously handicapped by the incessant inroads of the coyote. It is believed that in both cases means may be found which will materially lessen the magnitude of the losses from these sources.

GAME PROTECTION.

Plans for the coming year contemplate the continuation of work along the main lines already begun, and such special investigations and studies as means at hand will permit.

IMPORTATION OF FOREIGN SPECIES.

The trade in foreign cage birds has furnished a mass of data derived from applications for permits, inspection reports, and miscellaneous notes, of interest from both economic and ornithological standpoints. Some of these data will be prepared for publication during the year.

INTERSTATE COMMERCE IN GAME.

Work under this head will include investigation of the sources of supply for eastern markets, methods of handling game, and devices adopted to evade the shipping provisions of State and Federal laws. Efforts will be concentrated in regions which, by reason of local conditions or special cooperation on the part of State officers, seem to offer the best opportunity for effective action.

PUBLICATIONS ON GAME PROTECTION.

The report on game commissions and methods of enforcing game laws will be completed. The bulletin on the migration and protection of shore birds; a summary of the game laws for 1904 relating to seasons, sale, shipment, and licenses; and a directory of game officials and organizations will be issued during the year. And if practicable, the compilation of laws concerning nongame birds, published as Bulletin 12, will be revised and brought down to date.

INFORMATION CONCERNING GAME LAWS.

Under the provisions of the act of May 25, 1900, the work of the Department relating to game protection must be carried on "subject to the laws of the various States and Territories." Full knowledge of the laws, which is essential in order to conduct the work successfully and to answer many of the inquiries received, involves familiarity with the general literature of game legislation. This literature is widely scattered and may be divided into three main classes: (1) Statutes, found in the session laws and revised statutes of the various States; (2) interpretation of the laws by the higher courts, found in the official reports; and (3) a great mass of publications neither legislative nor judicial, consisting of special treatises, discussions and papers, and less formal notes. Much of the matter in this last class is published in current periodicals, poorly indexed and difficult of access, but some of it is very valuable in throwing light on special questions of precedent or procedure. It is proposed to issue publications covering these three classes somewhat as follows: (1) Periodical bulletins on game laws and legislation affecting nongame birds, and a special bulletin on game commissions; (2) an index and abstract of the more important decisions of the courts involving the construction of game laws; and (3) a bibliography of the general literature of the subject.

SPECIAL INVESTIGATIONS.

Among the special investigations which it is desirable to take up as soon as means permit is one concerning game preserves. This involves the determination of the number, area, location, and character of the holdings now owned or leased by corporations or individuals for the preservation of game. Private game preserves have increased greatly in number during the past decade, and their value is becoming more and more generally recognized.

The extent to which birds are killed by cold winters should be investigated, with a view to the discovery of means by which such destruction may be lessened. The severe winter of 1903–4 proved very disastrous to quail in the northern part of their range. In Maryland, and possibly elsewhere, experiments in feeding quail during severe weather seemed to meet with marked success.

Three requests have been received during the past year for cooperative work or for the preparation of special publications which merit special consideration, both on account of the sources from which they come and because they are directly in line with the work of game protection.

(1) A request was received from the chairman of the senate committee on fisheries and game of the New York legislature for a publi-

cation on the protection of wild fowl with special reference to spring shooting. This subject has already engaged the attention of the office, and some data have been accumulated. Before the request can be complied with, however, more facts must be acquired and some special studies undertaken.

(2) The New York State Library is undertaking a comprehensive index of legislation and has requested the cooperation of the Biological Survey in preparing an index of the State laws relating to game. The want of such a convenience is constantly apparent, and such an index would prove of the greatest utility not only in the routine work of the office, but also to persons who have occasion to know what laws States have passed covering certain features of game protection.

(3) From Brazil comes a request for a bulletin on legislation for the protection of nongame birds in the countries of Central and South America and the West Indies on the same lines as the bulletin already issued for the United States and Canada. In view of the large number of our birds which pass the winter in the West Indies and South America, the value of such a publication can be readily understood. The demand for a work of this kind, both in this country and abroad, is indicated by the fact that during the past year the Mexican Government has translated the main part of Bulletin No. 12, "Legislation for the Protection of Birds Other than Game Birds," into Spanish and issued it as a bulletin of its Secretaría de Fomento.

RECOMMENDATIONS.

The Biological Survey is charged by Congress with three distinct lines of work, each of coordinate value with the ordinary departmental division. These are: (1) Section of geographic distribution; (2) section of economic ornithology; (3) section of game protection.

In submitting estimates for the fiscal year 1906 the following recommendations are respectfully made:

(1) That the Biological Survey be recognized as a bureau, with the three sections as separate divisions.

(2) That an increase of $4,850 in the statutory roll be granted to enable the Secretary to reorganize the Biological Survey as a bureau of the Department.

(3) That an increase of $5,000 in the lump fund be granted to provide for the greatly increased demands for information and field work on geographic distribution, economic ornithology, and game preservation, and to enable the Survey to retain the services of trained assistants.

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